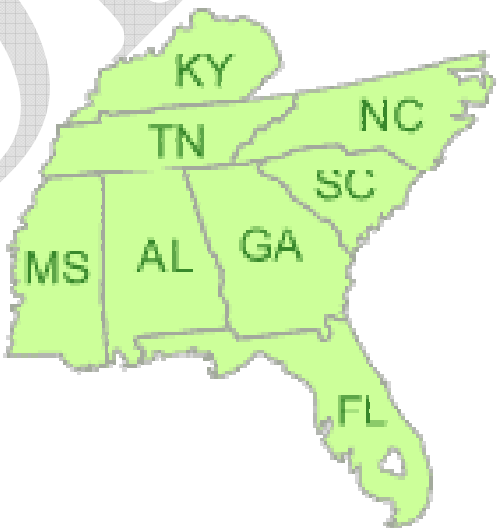
Biodiesel Production in Municipalities and High Schools
A Primer

Providing Green Job Training, Improving Children's Health and Reducing Air Pollution

U.S. EPA Region 4



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Please note that the information provided in this primer is offered as a service to Region 4 stakeholders but is not intended to relieve the user from its responsibility to obtain appropriate approvals under any applicable federal, state or local rules or regulations pertaining to the activities associated with the collection of waste grease or the production and use of biodiesel. Note that selling biodiesel in commerce is outside the scope of this primer. The intended audience only includes those that produce biodiesel for their own use.

Introduction

The goal of this initiative is to stimulate interest in creating biodiesel from waste oil and grease to fuel diesel vehicles and equipment. This project is designed to provide multiple benefits by reducing harmful air emissions, protecting children's health, saving money by reducing fuel costs, and creating green job training for high school students. Using biodiesel improves air quality by reducing greenhouse gas emissions, and other air pollutants. Using waste oil from cafeterias, restaurants, and local residents as the feedstock takes what is otherwise a waste, often disposed of through the sewer systems – polluting our water supply and damaging our infrastructure – and makes it a useful fuel.

Fewer air emissions produced by displacing petroleum based diesel also means school buses powered by biodiesel are much safer for our children, although the buses may smell like French fries! Because the major feedstock of this process is a waste, this fuel is inexpensive to make. The more it is used to displace petroleum based diesel the greater the potential cost savings. Finally, teaching the production of biodiesel as part of a science or technical curriculum in high schools will provide not only the required science education but also hands on training in an industry that is green.

EPA Region 4 developed this document as a starting point for municipalities, high schools, and others who are interested in these goals. Included are case studies from high schools and municipalities that already produce biodiesel from waste oil with great success. These case studies provide concrete examples to use in developing your own production program. This toolkit also provides information about the cost of setting up such a production process, what is involved in the process itself, information about the environmental benefits of using biodiesel and links to other sources of information about making biodiesel from waste oil.

Purpose

This is meant as a resource for school districts and municipalities to use when considering the benefits of developing their own biodiesel production programs.

Why Biodiesel

The production of biodiesel is a growing and important industry in the Southeast and is useful in both rural and urban settings. The upfront financial investment to start a biodiesel-from-waste oil production process is relatively low; the cost of equipment to recycle waste oil and produce biodiesel is approximately $30,000, depending on the size of the system. This type of program could eventually be self supporting, and may even generate a profit if the diesel produced is sold.[1] There are examples in Region 4 of communities recycling waste grease and producing biodiesel for less than a dollar per gallon to fuel their municipal fleets. Additionally, biodiesel is non-volatile, non-toxic, and biodegradable.

This program could be a valuable asset to high school students. By combining concepts from chemistry, physics, mathematics, environmental science, and biology with practical skills in pipe fitting, plumbing, carpentry, mechanics, and electrical systems, the biodiesel production process provides students with real-world experience as they learn. Additionally, this process is appropriate in both rural settings, as more farmers turn to waste and other feedstock to produce biodiesel for a cheap fuel source for their operation, as well as urban settings. Programs adopted by cities such as the creation of a Zero Waste Zone in Atlanta provide a market for skilled laborers as businesses pledge to recycle waste grease to create biodiesel. Students that learn these skills now will be more marketable in a new, green economy, while contributing to the reduction of air pollution.

[1] Note that selling biodiesel requires approvals and permits not discussed in this paper.

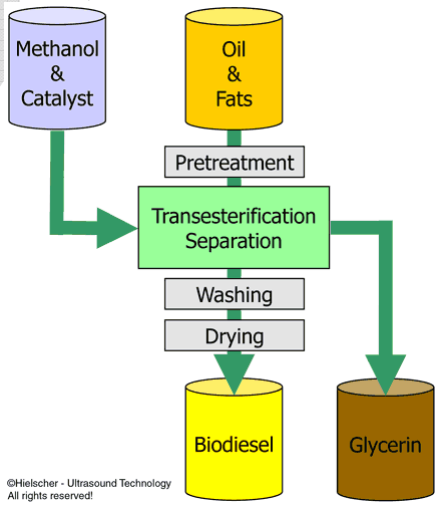
Process Information

So, how do you make biodiesel? Is it safe?

What is it?

Biodiesel fuel is a cleaner burning, renewable fuel made from any biologically based oil or fat. From 100 pounds of oil and 10 pounds of methanol, the process produces 100 pounds of biodiesel and 10 pounds of glycerol. This initiative focuses on using waste vegetable oil collected from local restaurants, school and hospital cafeterias, colleges, vendors at public events, and local industry that generates waste grease. Depending on where you live, waste grease can be free or cost a nominal amount. In many areas, waste grease haulers are paid by the generators to have it disposed. Or, it may end up poured down the drain, clogging local pipes. Animal fats, such as poultry fat, are another source of raw material for biodiesel production and in certain areas of the Southeast may be plentiful and inexpensive or free. Waste oil must be filtered before processing to remove debris, and any water in the waste oil must also be removed prior to production.

To produce the fuel, the fat goes through a process called **transesterification**. During this process, the waste grease is mixed with a methanol and alkaline (lye) solution. The lye can be made from potassium hydroxide (KOH) or sodium hydroxide (NaOH) which acts as a catalyst for the reaction. The ingredients are put into a reactor and then mixed and heated. Once the reaction is complete, there are two distinct layers present: biodiesel (which floats to the top) and a bottom layer containing glycerin by-product.



Since some methanol is still present in both the fuel and the glycerin layers at the end of the transesterification reaction, a process called **methanol recovery** may be conducted on both layers separately to recover the chemical. This methanol may be re-used in the next batch of fuel.

During transesterification, a soapy substance forms in the fuel layer that must be washed out. This is accomplished by washing the fuel with water several times and letting the fuel dry by allowing the water to evaporate. The biodiesel can be stored in the same holding tanks as petroleum based diesel. The two fuels can be mixed. Combining one part biodiesel to four parts petroleum diesel (i.e. 20% biodiesel, also called B20) results in a typical mixture used in diesel engines.

By-products

Glycerol (or glycerin) by-product is a significant consideration for anyone undertaking biodiesel production. For every five gallons of biodiesel produced, approximately one gallon of crude glycerol by-product results.

Glycerol is a sweet tasting clear, colorless, odorless, viscous liquid that is completely soluble in water. High quality glycerol can be sold to cosmetics producers and pharmaceutical companies. Glycerol of lower grades may be used to produce industrial soaps. In some areas glycerin from the process that has had any leftover methanol removed may be composted as a fertilizer amendment.[2] Separating glycerol from biodiesel is simple because the glycerol settles on the bottom of the tank. It can then be drawn off the bottom of the settling vessel.

At Key West High School they are using some of the glycerol produced by the process to further refine the biodiesel. Basically, any methanol or sodium hydroxide left in the biodiesel will settle into the glycerol and be removed with it. This glycerol is then used to condition incoming waste oil to refine it. The better the quality (i.e. fewer food remnants, water) waste grease, the fewer chemicals required to produce biodiesel, thus making the entire process less expensive.

[2] This is allowed in some states and localities. You must check with your local regulators before you compost glycerin.

Is it safe?

Biodiesel is very safe, which makes it appropriate to use as a learning tool for kids.

- Biodiesel's flashpoint is 200 degrees Fahrenheit which is well above petroleum diesel (flashpoint of 125 degrees Fahrenheit). This makes biodiesel safer to store, handle, and use than petroleum products.
- Biodiesel is non-toxic. Table salt is ten times as lethal as biodiesel.

FLASHPOINT is the temperature at which a chemical can readily catch fire and sustain combustion.

Material Safety Data Sheet

The methanol and potassium or sodium hydroxides that are used in the biodiesel process are hazardous materials, and must be handled carefully. Several environmental and community right to know laws require information on chemicals such as methanol and hydroxides be kept on-site where such materials are used. This information should be contained in a material safety data sheet (MSDS) and made available to all who use these materials.[3]

Quality Control Note: prior to use as a commercial fuel for sale, biodiesel must be tested to demonstrate it meets the ASTM International biodiesel standard D6751. All biodiesel produced for sale must also be registered with EPA pursuant to 40 C.R.F. Part 79.

Helpful Hint: It is strongly recommended that initial batches of biodiesel produced be fully tested to ensure they are of high quality and appropriate for use in diesel engines. An on-going quality control program should be instituted, including an ongoing testing program, to ensure the continued high quality of the biodiesel produced.

NOTE: In Kentucky, all biodiesel utilized in vehicles operating on Kentucky highways is subject to a production quality standard. Check with local regulatory authorities about requirements.

[3] For more information visit: http://www.epa.gov/tribalcompliance/wmanagement/wmregsdrill.html#material

Environmental Benefits

Biodiesel is:

- Renewable
- Biodegradable
- Reduces greenhouse gases that contribute to climate change
- Reduces other air pollution
- Is non-toxic

Life Cycle Analysis

One way the environmental benefits of biofuels can be evaluated is through a "life cycle analysis." One type of life cycle analysis gauges how much total energy it takes to produce a fuel versus the amount of energy provided by the new fuel. This includes all the energy needed to plant seeds for feedstock or to pump oil out of the ground through to the distribution of the final product. Applying a life cycle analysis to biodiesel shows that biodiesel generates three times the energy it takes to create it. The opposite is true of petroleum diesel which requires more energy to make that it produces. This analysis demonstrates an advantage to the environment of using biodiesel; it requires less energy to make and therefore reduces emissions.[4]

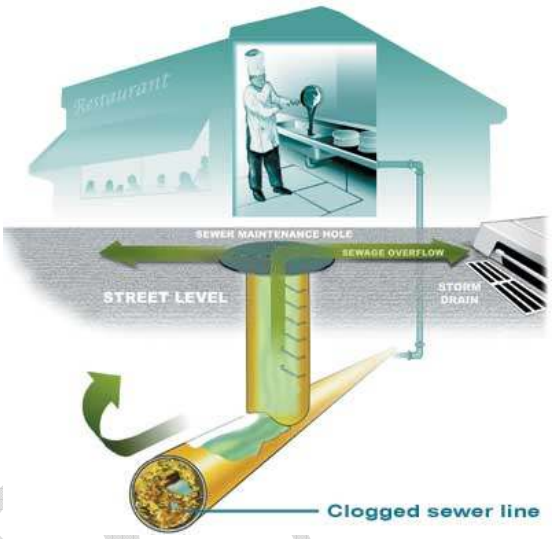
> ***"…biodiesel is worth three times the energy it takes to create it."***

Additionally, the National Biodiesel Board reports that biodiesel emits 78% less carbon dioxide emissions than petroleum based diesel.[5] Biodiesel also reduces tailpipe emissions of particulate matter (PM), hydrocarbons (HC) and carbon monoxide (CO). This is because biodiesel contains more oxygen by weight. Oxygen allows the fuel to burn more completely, further reducing air emissions.

[4] University of Tennessee, Office of Bioenergy Programs: *Biodiesel: A Primer*.
[5] National Biodiesel Board "Benefits of Biodiesel" citing a study by the U.S. Department of Energy; National Renewable Energy Laboratory "Biodiesel Handling and Use Guide" January 2009

Water

Thousands of gallons of grease are improperly disposed of every day. Much of this grease is poured down sinks and drains which creates major problems for our sewer systems including clogs and sewage overflows. Cooking grease coats pipelines, eventually causing blockage and potential sewer spills.



Redirecting used cooking oil collected from the public into biodiesel production reduces the amount of grease improperly poured down sinks and drains and reduces the number of sanitary sewer overflows.

Additionally, a study by the United States Departments of Agriculture and Energy revealed that the production of biodiesel generates 79% less wastewater and 96% less hazardous waste than the production of petroleum fuels.[6]

Landfill Capacity

In areas of the country where landfill capacity is an issue, redirecting used cooking oil collected from local eateries and the public, which is normally disposed in landfills, conserves valuable landfill space.

[6] National Renewable Energy Laboratory, "An Overview of Biodiesel and Petroleum Diesel Life Cycles" NREL/TP-580-24772, May 1998.

Non-Toxic

Working with biodiesel is safer when compared with petroleum diesel, because biodiesel is non-toxic, biodegradable, and less combustible.

Case Studies

Key West High School

At Key West High School, students are learning how to make biodiesel from waste oil in their science lab. Through this program students are developing sophisticated chemical engineering techniques and entrepreneurialism. These students are learning green job skills while reducing the amount of grease disposed of into sewer systems as they use waste grease from local businesses as their feedstock. As the biodiesel production increases, the students hope to fuel their school buses with what they produce. This will lower fuel costs for the school while reducing greenhouse gas emissions associated with traditional diesel fuel.

Costs

- Project began in the Fall of 2008
- The school sought $80,000 from the Monroe County School Board (Board) for the 2008-09 school year, and received $50,000
- If the project is successful, the school predicts recouping most of the start up costs for the project within two years by using the biodiesel in the school buses at the high school, saving on fuel costs
- The monies go toward purchasing the methanol and lye catalyst, and the production equipment.

Curriculum

- The class is taught as part of a 2 hour course for seniors: one hour is physics and the other hour is a lab that focuses on renewable energy
- In the 2008-2009 school year, 27 students participated in the course and interest is very high
- Students work on different aspects of the project including public relations, video production, marketing, research and finance
- The students were charged with developing many aspects of the program themselves
- The students are building their own processing equipment so that they can process more biodiesel at a time: currently, they are using a

processor that can produce 175 to 350 gallons per week depending on the amount of time that is dedicated to actual production

Feedstock and Byproducts

- The students obtained the feedstock necessary for the process by contracting for the supply of methanol and used vegetable oil
- Students worked with businesses in the community to arrange regular purchase and transport of the used oil
- As word spread in the community about this project, local citizens helped out by bringing used cooking oil to the school for the students to use
- Methanol was purchased from a chemical company in Virginia, which was the least expensive supplier they could find, after the students did some comparison shopping
- Some of the seed money from the school board is used to purchase these items
- Typically three or four 55 gallon drums of methanol is stored in a fire marshal approved, locked, concrete building on campus[7]
- Glycerin is a by-product created by the production of biodiesel. The plan for this by-product at Key West High School is to use it to make soap. The students may make decorative soaps and sell them to tourists.
- Currently the little glycerin that has been produced from the process (about 100 gallons so far) is being stored on-site. Some of it is used to 'precondition' the waste grease feedstock to dehydrate the oil and prepare it for the conversion process.
- Key West High uses potassium hydroxide instead of sodium hydroxide, which creates a biodegradable glycerin by-product so that it may be composted in the future.

Hoover Alabama

To prevent sewer clogs from waste grease poured down sinks and to address rising fuel prices, the city of Hoover started a waste oil recycling program with local restaurants and residents. Hoover uses the oil to make

[7] Note that many communities have limits on the amount of methanol that may be stored in occupied buildings. Working with the local authorities, this obstacle may be overcome by storing the methanol in a separate, approved storage shed or other storage building. This is a case by case determination.

biodiesel which fuels its fleet cars, heavy equipment such as construction equipment, and even as the fuel source for the treatment plant's emergency generator municipal fleet of diesel vehicles. This program has been a great success saving Hoover a significant amount of money on fuel costs.

Costs

- Hoover began by investing $25,000 in biodiesel and recycling program equipment
- Hoover is able to produce biodiesel for less than $1 per gallon
- Its investment in the equipment was paid off in 200 days
- Hoover has the largest alternative fuel fleet in the nation: 85% of its cars run on biodiesel

Feedstock, Process, and Byproducts

- Hoover created a community recycling program for waste oil and grease to use as feedstock
- Currently purchases methanol for approximately $3.10 a gallon and stores in 55 gallon barrels.
- Typically has 50-150 gallons of methanol stored at a given time stored in a concrete room with sprinkler system
- Hoover is producing approximately 15,000 gallons annually: they would produce more but do not have the manpower
- Glycerin by-product was originally composted but is currently being given to a company that uses it to make car wash soap. This company provides the barrels and picks up the glycerin

Grundy High School, Tennessee

Students at Grundy High School in rural Tennessee are learning how to make biodiesel in their vocation/agriculture classes and in their science classes as part of a cross curriculum program. Two Grundy High School teachers were trained to produce biodiesel at nearby Middle Tennessee State University.

Costs and Startup

- The school purchased a Fuelmeister II closed system from C & E Biodiesel in Nashville for $2,300.
- C & E provided a tutorial on how to use the equipment.

Feedstock, Process, and Byproducts

- The students collect waste grease from their cafeteria, local restaurants, and a local manufacturer whose process generates waste grease.
- The methanol feedstock comes from a local farmer's cooperative and the school purchases it in 55 gallon drums.
- Biodiesel is produced by the students in 40 gallon batches.
- The biodiesel the students produce is used in farming equipment by the agriculture department and in other diesel equipment used by the school.
- Grundy High School worked with its local Fire Marshall in setting up the production process to make sure it was safe and met local standards.
- The local Fire Marshall provided input: for example he requested the school buy a closed loop Fuelmeister II system instead of an open loop system to ensure the safety of students
- The team at Grundy High School is working on using the glycerin by-product from the process to make fire starter logs by mixing it with sawdust and recycled newspapers.
- The glycerin is currently used as a great cleaning solvent around the school, including the cafeteria. It strips rust off old machine parts and cuts grease in the cafeteria better than any commercially available product.

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Start-up Costs/Cost Savings

The cost for the biodiesel processing equipment can be from $2,000, if you build it yourself,[8] to $20,000 for a unit with a process guarantee.

The Hoover Alabama biodiesel processor or unit and all associated containers and community recycling materials for the waste oil cost approximately $25,000 - $30,000. This unit produces up to 110 gallons a day of biodiesel. Smaller processors that produce up to 40 gallons in a 24 hour period can cost as little as $3,000.

Many states provide financial incentives for the production of alternative fuels such as biodiesel. For a list of **state by state incentives** to produce biodiesel, visit the Department of Energy's Alternative Fuels and Advanced Vehicles Data Center's Biodiesel section at: http://www.afdc.energy.gov/afdc/fuels/biodiesel_laws.html.

Also, redirecting used cooking oil into biodiesel production reduces the amount of improperly disposed fats, oils, and grease and reduces the overall costs associated with water and sewer maintenance.

A biodiesel production facility can provide insulation against variable fuel costs and can act as an alternative fuel supply in the event of a natural disaster or national emergency.

Gaston County, North Carolina

- In Gaston County North Carolina, the school district has been running school buses on biodiesel made from waste grease since 2005.
- The first year they produced biodiesel (2005), they made 10,000 gallons.
- In 2007 they opened a major production facility that produces 500 gallons per day.
- Gaston County is fueling 100 school buses with the biodiesel it produces.
- School officials estimate it costs approximately 95 cents to produce a gallon of biodiesel.

[8] See: http://ucobiodiesel.com/ for instructions on how to build a biodiesel processor.

The district invested $100,000 in the new biodiesel production facility and saved roughly $125,000 in fuel costs in 2007 alone.[9]

Alabama

- A school in Alabama is launching its own program to produce biodiesel from waste oil as an educational aid and to fuel its diesel equipment.
- It has estimated its monthly diesel fuel bill is approximately $7,000 - $14,000 per month, depending on fuel prices. This fuel powers a fleet of school buses, maintenance trucks, state vehicles and lawn/ground equipment.
- The goal is to produce enough biodiesel to use in two tractors, three maintenance vehicles, seven lawnmowers, and 10 school buses.
- The school hopes to initially create 55 gallons of biodiesel fuel per day or 1,100 gallons per month, an estimated savings of $2,417.80 to $4,694.80 per month (May 11, 2008, diesel prices for PADD III, Gulf Coast, were $4.268 per gallon, including taxes. May 11, 2009, prices were $2.198 per gallon)[10]

[9] See: http://www.wcnc.com/news/topstories/stories/wcnc-103107-krg-biodiesel.1c48fe1fe.html; http://www.innovations.harvard.edu/news/148141.html

[10] Energy Information Administration, www.tonto.eia.doe.gov/oog.info/wohdp/List_Serve_report_All.txt

Curriculum

Erin Gawron, a teacher at Heritage High School in Rockdale County, Georgia, is using the biodiesel production process to teach her science classes. She created the lesson plans after working in the Georgia Internships for Teachers program. Through this program, Erin researched biofuels by traveling to the National Renewable Energy Lab, various ethanol and biodiesel plants, and Iowa State University. She worked at the University of Georgia with Dan Geller and Dr .Tom Adams researching the production of biodiesel from peanut oil. She decided to created a chemistry class that incorporates biodiesel into almost every chapter of the standard first year chemistry book. Her students make biodiesel out of used oil.

The lessons may be used or modified for other science courses and are found at:

http://www.teachbiofuels.org/Biodiesel%20Lessons%20&%20Labs.html

Potential Regulatory Requirements

The production of biodiesel may be subject to various environmental regulatory obligations including regulations protecting air, water, land resources as well as regulations regarding the safe handling of hazardous materials and the proper disposal of waste. Some of these regulations apply to small producers as well as larger ones. This primer does not contain a comprehensive review of the regulatory obligations of biodiesel producers. U.S. EPA Region 7 has developed a comprehensive guide to federal environmental regulations that affect biodiesel production.[11] While the above document focuses on commercial biodiesel manufacturing, and many of the municipal and school biodiesel plants may not generate enough biodiesel to trigger certain requirements, it should be reviewed by anyone considering biodiesel production.

Additionally, any proposed project should be discussed with local and state regulatory authorities on a case-by-case basis to assure compliance with all legal obligations regarding production and use of biodiesel.[12] What follows is a brief discussion of potential areas of regulation to be aware of before undertaking biodiesel production.[13]

Air Pollution

Process equipment including reactors, separators, evaporators, process vents, pump and valve leaks, and condensers may require air permits. If the facility is capable of producing 1,102 tons of glycerol a year (which equates to an operation that produces approximately three million gallons or more biodiesel a year), it is subject to federal EPA regulation.

Note: Gaston County, NC (above) is fueling over 100 school buses by producing less than 200,000 gallons of biodiesel a year – to reach the threshold for this regulation; a producer would have to be producing 15 times that amount.

[11] "*Environmental Laws Applicable to Construction and Operation of Biodiesel Production Facilities*" (November 2008) www.epa.gov/region07/priorities/agriculture.
[12] See Gateway to State-by-State Resource Locators, http://www.envcap.org/statetools/#solid.
[13] See e.g. *Virginia Biodiesel Environmental Compliance Primer*, January 2008; Ohio EPA "*Want to Start a Biodiesel Production Operation? Environmental Compliance Basis*" April 2007; www.epa.state.oh.us/ocapp/sb/publications/biodieselguide.pdf.

Water Pollution

Discharging Wastewater

Discharges to a Municipal Wastewater Treatment Plant

If you want to discharge to your local wastewater treatment plant (called a publically owned treatment works, or POTW), contact them directly for local requirements and to see if you need a discharge permit. Wastewater from biodiesel production may be high in fatty acids and glycerin, and can have a high biochemical oxygen (BOD) demand. Because POTWs are not generally designed to treat wastewater containing chemicals, oils, and other contaminants from manufacturing processes, you may be required to treat the wastewater prior to discharge.

Direct Discharges to Waters of the U.S.

If you want to discharge wastewater directly to any waters of the U.S., you must first get a National Pollutant Discharge Elimination System (NPDES) discharge permit from your state environmental protection agency. Examples of waters of the U.S. include most streams, rivers, and lakes. NPDES permits typically contain discharge limitations, monitoring, and reporting requirements.

Spill Prevention Control and Countermeasure (SPCC) Plans

If you have an aboveground aggregate storage capacity for oil or oil products (including vegetable oils) of greater than 1,320 gallons, the requirements of the Spill Prevention Control and Countermeasure program will apply. If you are storing oil in containers less than 55 gallons in size, you do not need to include these in calculating your SPCC storage capacity.

The SPCC program is administered under federal regulations by U.S. EPA. For more information visit the U.S. EPA's SPCC web site at: www.epa.gov/oilspill.

Hazardous Waste Regulations

If you have a material that can no longer be used, or cannot be sold/recycled, it is considered a waste. Solid wastes generated from a business must be evaluated to determine if they are hazardous wastes. States have specific regulations on how hazardous wastes must be handled and disposed. Hazardous wastes cannot be thrown in your solid waste dumpster

along with your normal trash. There are also record keeping requirements to comply with.

Hazardous waste management requirements vary according to the amount of hazardous waste generated in a given month. Operators of facilities that generate less than 100 kg (220 pounds) of hazardous waste per month are called conditionally exempt small quantity generators (CESQG). The requirements for a CESQG are minimal. Primary among the applicable requirements, generators must make a hazardous waste determination for each waste stream at the point of generation. This requirement applies to all solid waste generators. A CESQG must also ensure that its waste is disposed according to the regulations.

Your biodiesel operation may not generate any hazardous waste, but it is important to have records on-site to show how you evaluated all your waste streams to prove they are nonhazardous.

> CAUTION:
>
> The largest potential hazardous waste streams from the biodiesel production process are waste methanol and waste glycerin. If you cannot find a recycling market for glycerin, this waste and any other wastes you generate must be properly evaluated and stored prior to disposal.
>
> Depending on the efficiency of the process, waste glycerin may meet the definition of ignitable hazardous waste because it contains methanol, which can give the waste a low flash point.

Solid wastes that are not hazardous wastes are regulated by state and local agencies. Each state has its own regulations for solid waste disposal, contact your state's RCRA program for further information on hazardous waste determinations, disposal and record keeping requirements.

Emergency Planning and Community Right-to-Know Act (EPCRA)[14]

Under the EPCRA, facilities storing hazardous chemicals on-site must report this to local emergency authorities. A facility must submit a report if the quantity of the hazardous chemical is in excess of the threshold quantity.

[14] 42 USC § 11002 (b)(1)

Hazardous Chemicals

Methanol, sodium hydroxide, potassium hydroxide, and glycerin are considered hazardous chemicals.

Threshold Quantity

The threshold quantity (TQ) for hazardous chemicals under Sections 311-312 is 10,000 pounds. This TQ is for each chemical, not the aggregate of all chemicals combined. If you store or produce these chemicals in excess of the TQ, you will be subject to reporting requirements under the EPCRA.

Local Regulations

Safety

Meet your Fire Marshal

Many state Fire Marshals have requirements about where and how biodiesel should be stored and produced. Most likely production will occur in a separate space from the classroom.

- In Key West, they are using a storage shed to house the production equipment and to store the materials. The shed is concrete and contains no electrical outlets.
- In Grundy, the Fire Marshall required a closed loop processing system to ensure safety.

State environmental regulation of biofuels production often depends on the size of the manufacturing facility and the manufacturing process. Potential permitting issues include the disposal of waste water which would require a discharge permit, air permits, and storm water permits.

Selling Biodiesel in Commerce

If you decide to sell the biodiesel you produce in commerce, you will be required to register the fuel with the U.S. EPA. You are required to complete a registration form and supply additional information about the biodiesel to the EPA. To find these forms and for more information, go to: www.epa.gov/otaq/regs/fuels/rfgforms.htm.[15] Additionally, other laws and regulations apply to those who sell biodiesel, which is outside the scope of this document.

Myths

There are some common questions that arise when talking about producing biodiesel for use in diesel vehicles, and several of these raise concerns that are misplaced. Listed below are some common misconceptions; for a more comprehensive list of biodiesel facts, review the National Biodiesel Board's Myth and Fact Sheet available on their website at www.**biodiesel**.org.

Myth: Biodiesel causes filters to plug.

Fact: Biodiesel can be operated in any diesel engine with little or no modification to the engine or the fuel system. Pure biodiesel (100% or "B100") actually acts as an internal engine/fuel tank cleaner which may release deposits accumulated in the engine system from petroleum based diesel use. This cleaning effect may clog the engine's fuel filters until the old petroleum diesel residue is removed, although this is not really an issue for lower biodiesel blends such as B20.

Myth: Biodiesel will create a problem with engine warranty coverage.

Fact: All major U.S. automakers and engine manufacturers accept the use of up to at least 5 percent biodiesel (B5), and many major engine companies

[15] Note - Selling biodiesel commercially will trigger other federal, state and local requirements and is beyond the scope of this primer.

have stated formally that the use of high quality biodiesel blends up to twenty percent biodiesel (B20) will not void their parts and workmanship warranties. For a listing of specific statements from the engine companies, please visit the National Biodiesel Board Web site at: www.biodiesel.org/resources/oems.

Myth: Biodiesel doesn't perform well in cold weather.

Fact: Biodiesel will gel in very cold temperatures just as the common #2 diesel does. In cold weather, gelling of fuel can be controlled by adjusting the amount of biofuels used in the fuel. Typical blends of 20% biodiesel are managed with the same fuel management techniques as #2 diesel.

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Useful Resources

National Renewable Energy Laboratory: Biodiesel Handling and Use Guide, January 2009

http://www.nrel.gov/vehiclesandfuels/npbf/feature_guidelines.html

National Biodiesel Board's Biodiesel Use and Handling Guide:

http://www.nrel.gov/vehiclesandfuels/pdfs/43672.pdf

EPA's Regulatory Requirements Guidance for Biodiesel Producers:

http://www.epa.gov/otaq/renewablefuels/420b07019.pdf

Producing Biodiesel for Municipal Vehicle Fleets from Recycled Cooking Oil

http://www.nrmdi.auburn.edu/bio/documents/AUMuncipalBiodieselGuideFINAL.pdf

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http://www.teachbiofuels.org

"Environmental Laws Applicable to Construction and Operation of Biodiesel Production Facilities" (November 2008) EPA Region 7

www.epa.gov/region07/priorities/agriculture